ECLIPSES AND TRANSITS OF THE SATELLITES OF *SATURN* OCCURRING IN THE YEAR 1908.

By Hermann Struve.

For the present year the cycle of eclipses and transits of the satellites of *Saturn* extends over all inner satellites, including *Rhea,* the latter being eclipsed only during the earlier months, till September, before the opposition of the planet.

An interesting feature of the present cycle of eclipses is, that the disappearances of the satellites before opposition occur generally at a greater distance from the limb of *Saturn* than the reappearances after opposition, and are therefore easier to observe. In the preceding years, before the Earth had passed the plane of the ring, the contrary was the case—i. e. the reappearances could be observed at the greater distance from the planet.

Of particular interest is the remark, that in the case of *Rhea,* describing only a small chord through the shadow-cone of the planet, both phenomena, the disappearance and the reappearance, occur geocentrically outside of the limb, and can be observed together. And as the predicted times of disappearance and reappearance depend chiefly and in a very high degree on the assumed polar diameter of the planet, the observation of these phenomena will be of great value for the derivation of this constant, unknown at present to some tenths of a second. To direct the attention of the observers to these interesting observations, I have first collected the data for the eclipses of *Rhea,* which can be observed also with smaller instruments.

The tables of the eclipses of the other satellites are arranged in the same manner as in the preceding years.[1] For these satellites only the disappearances are visible before opposition, and only the reappearances after opposition. The first column contains the day of the month, the second the eclipsed satellite, the third the Greenwich time of disappearance or reappear-

[1] See these *Publications,* Vol. XVIII, p. 203; Vol. XIX, p. 125.

ance, and the last, headed *s* and *p*, the geocentric place of the satellite at the given time—i. e. the distance of the satellite from the limb of the planet, and the position-angle, counted from the north point of the minor axis of the disk to the east. The duration of the appearances may be, in the case of *Tethys* and *Dione*, two or three minutes, in the case of *Rhea*, passing near the surface of the shadow-cone, much longer. The time of first or last seeing must be noted, and also the times of equal brightness by comparison with the other satellites.

Finally are added the approximate Greenwich times, when the shadows of the satellites *Tethys*, *Dione*, and *Rhea* cross the minor axis of the disk, together with their distances from the center of the disk at the time of conjunction. Possessors of powerful instruments searching for the shadows may decide the question, whether they are discernible on the disk of the planet.

The present opposition of *Saturn* will be the last for many years, where the brighter satellites will be eclipsed. In the next year only eclipses of *Enceladus* and *Mimas* will take place. On account of the important conclusions, to which the observations of the eclipses lead, it is to be hoped that the favorable opportunity will not be lost, and that the observers will duly attend to these rare and interesting phenomena.

In the preparation of the following tables I was kindly assisted by Dr. NEUGEBAUER:—

ROYAL OBSERVATORY, BERLIN, April, 1908.

ECLIPSES OF *RHEA*.

s and *p* denote the geocentric place of *Rhea* at the time of disappearance or reappearance—i. e. the distance from the limb of the planet, and the position-angle, counted from the north point of the minor axis to the east.

1908.		Gr. M. T.	s.	p.	dt for da $= 0''.1$	Meridian Passage.
June 15.	Disapp.	$17^h\ 40^m$	$7''.1$	$232°$	$\mp 2^m$	$19^h\ 0^m$
15.	Reapp.	20 7	1 .9	189		
20.	Disapp.	6 9	7 .2	232	∓ 2	18 42
20.	Reapp.	8 32	2 .1	191		
24.	Disapp.	18 38	7 .4	231	∓ 2	18 27
24.	Reapp.	20 57	2 .3	192		
29.	Disapp.	7 7	7 .5	231	∓ 2	18 8
29.	Reapp.	9 22	2 .5	193		
July 3.	Disapp.	19 36	7 .5	230	∓ 2	17 53
3.	Reapp.	21 47	2 .6	193		
8.	Disapp.	8 5	7 .5	230	∓ 3	17 34
8.	Reapp.	10 13	2 .7	194		
12.	Disapp.	20 34	7 .4	229	∓ 3	17 18
12.	Reapp.	22 38	2 .8	194		
17.	Disapp.	9 4	7 .3	228	∓ 3	16 59
17.	Reapp.	11 2	2 .8	195		
21.	Disapp.	21 33	7 .1	228	∓ 3	16 43
21.	Reapp.	23 27	2 .8	195		
26.	Disapp.	10 3	6 .8	227	∓ 3	16 24
26.	Reapp.	11 52	2 .8	195		
30.	Disapp.	22 32	6 .5	226	∓ 3	16 8
31.	Reapp.	0 16	2 .7	195		
Aug. 4.	Disapp.	11 3	6 .2	225	∓ 3	15 48
4.	Reapp.	12 40	2 .7	195		
8.	Disapp.	23 33	5 .8	224	∓ 4	15 32
9.	Reapp.	1 5	2 .6	195		
13.	Disapp.	12 3	5 .3	222	∓ 4	15 11
13.	Reapp.	13 28	2 .5	194		
18.	Disapp.	0 34	4 .8	220	∓ 4	14 51
18.	Reapp.	1 52	2 .3	194		
22.	Disapp.	13 6	4 .3	218	∓ 5	14 35
22.	Reapp.	14 15	2 .1	193		
27.	Disapp.	1 38	3 .6	215	∓ 6	14 14
27.	Reapp.	2 38	1 .9	193		
31.	Disapp.	14 11	3 .0	211	∓ 7	13 57
31.	Reapp.	14 59	1 .8	193		
Sept. 5.	Disapp.	2 46	2 .4	207	∓ 8	13 37
5.	Reapp.	3 19	1 .6	193		
9.	Eclipse? (Heliocentric conj.)	15 29	1 .5	198	∓ 16	13 20
14.	Eclipse? (Heliocentric conj.)	3 57	...	...	....	12 59
18.	Eclipse? (Heliocentric conj.)	16 24	...	...	....	12 42

In computing these data, the values of the semi-axes of the planet were assumed to be: $a = 8''.735$, $b = 7''.825$, at the mean distance. On this supposition the latest eclipse of *Rhea* will take place September 5th. Supposing the semi-axes $0''.1$ larger, the end of the cycle of eclipses falls on the date Sep-

tember 9th, and the times of disappearance and reappearance will change by the quantities, expressed in minutes, given in the column headed "dt for da = 0″.1." The predicted times might therefore be changed greatly by the size of the planet, by the penumbra, etc., which could here not be taken into account.

It will be worth while to watch the satellite until its latest eclipses, in September, and to ascertain precisely the end of their cycle. For these observations, also, photometers may be used with success, as the brightness of the satellite will vary slowly.

ECLIPSES OF THE INNER SATELLITES OF *SATURN*, 1908.

Disappearance before opposition.

s and *p* denote the geocentric place of the satellite at the time of its disappearance—i. e. the distance from the limb of the planet, and the position-angle, counted from the north point of the minor axis to the east.

1908.		Gr. M. T.	*s.*	*p.*
July 1.	Mi.	23ʰ 4ᵐ	2″.6	256°
	Di.	23 10	5 .7	239
2.	Te.	11 34	4 .5	243
	En.	14 0	3 .6	248
	Mi.	21 41	2 .6	256
3.	Rh.	19 36 D	7 .5	230
	Mi.	20 18	2 .6	256
	Rh.	21 47 R	2 .6	193
	En.	22 54	3 .6	248
4.	Te.	8 52	4 .5	243
	Di.	16 52	5 .7	239
	Mi.	18 56	2 .6	256
5.	En.	7 47	3 .6	248
	Mi.	17 33	2 .6	256
6.	Te.	6 11	4 .5	243
	Mi.	16 10	2 .6	256
	En.	16 40	3 .6	248
7.	Di.	10 34	5 .7	239
	Mi.	14 47	2 .6	256
8.	En.	1 33	3 .6	248
	Te.	3 30	4 .5	243
	Rh.	8 5 D	7 .5	230
	Rh.	10 13 R	2 .7	194
	Mi.	13 24	2 .6	256
9.	En.	10 26	3 .6	248
	Mi.	12 1	2 .6	256
10.	Te.	0 49	4 .5	243

1908.		Gr. M. T.	*s.*	*p.*
July 10.	Di.	4ʰ 16ᵐ	5″.7	239°
	Mi.	10 38	2 .6	256
	En.	19 20	3 .6	248
11.	Mi.	9 16	2 .6	256
	Te.	22 8	4 .5	243
12.	En.	4 13	3 .6	248
	Mi.	7 53	2 .6	256
	Rh.	20 34 D	7 .4	229
	Di.	21 58	5 .7	238
	Rh.	22 38 R	2 .8	194
13.	Mi.	5 30	2 .6	256
	En.	13 6	3 .6	248
	Te.	19 27	4 .5	242
14.	Mi.	4 7	2 .6	256
	En.	21 59	3 .6	248
15.	Mi.	2 44	2 .6	256
	Di.	15 40	5 .6	238
	Te.	16 46	4 .5	242
16.	Mi.	1 21	2 .6	255
	En.	6 52	3 .6	248
17.	Mi.	0 59	2 .6	255
	Rh.	9 4 D	7 .3	228
	Rh.	11 2 R	2 .8	195
	Te.	14 4	4 .5	242
	En.	15 46	3 .6	248
	Mi.	23 36	2 .6	255
18.	Di.	9 22	5 .6	238

1908.		Gr. M. T.		*s.*	*p.*
July 18.	Mi.	22^h	13^m	$2''.6$	255°
19.	En.	0	39	3 .6	248
	Te.	11	23	4 .4	242
	Mi.	20	50	2 .6	255
20.	En.	9	32	3 .6	248
	Mi.	19	27	2 .6	255
21.	Di.	3	4	5 .5	238
	Te.	8	42	4 .4	242
	Mi.	18	5	2 .6	255
	En.	18	25	3 .6	248
	Rh.	21	33 D	7 .1	228
	Rh.	23	27 R	2 .8	195
22.	Mi.	16	42	2 .6	255
23.	En.	3	18	3 .5	248
	Te.	6	1	4 .4	242
	Mi.	15	19	2 .6	255
	Di.	20	46	5 .5	238
24.	En.	12	12	3 .5	248
	Mi.	13	56	2 .6	255
25.	Te.	3	20	4 .3	242
	Mi.	12	33	2 .6	255
	En.	21	5	3 .5	248
26.	Rh.	10	3 D	6 .8	227
	Mi.	11	11	2 .5	255
	Rh.	11	52 R	2 .8	195
	Di.	14	29	5 .4	237
27.	Te.	0	38	4 .3	241
	En.	5	58	3 .5	248
	Mi.	9	48	2 .5	255
28.	Mi.	8	25	2 .5	255
	En.	14	51	3 .4	248
	Te.	21	57	4 .2	241
29.	Mi.	7	2	2 .5	254
	Di.	8	11	5 .3	237
	En.	23	44	3 .4	248
30.	Mi.	5	39	2 .5	254
	Te.	19	16	4 .2	241
	Rh.	22	32 D	6 .5	226
31.	Rh.	0	16 R	2 .7	195
	Mi.	4	17	2 .5	254
	En.	8	38	3 .3	247
Aug. 1.	Di.	1	53	5 .2	237
	Mi.	2	54	2 .5	254
	Te.	16	35	4 .1	241
	En.	17	31	3 .3	247
2.	Mi.	1	31	2 .5	254
3.	Mi.	0	8	2 .4	254

1908.		Gr. M. T.		*s.*	*p.*
Aug. 3.	En.	2^h	24^m	$3''.3$	247°
	Te.	13	54	4 .0	241
	Di.	19	35	5 .0	236
	Mi.	22	46	2 .4	254
4.	Rh.	11	3 D	6 .2	225
	En.	11	17	3 .2	247
	Rh.	12	40 R	2 .7	195
	Mi.	21	23	2 .4	254
5.	Te.	11	13	4 .0	241
	Mi.	20	0	2 .4	254
	En.	20	11	3 .2	247
6.	Di.	13	18	4 .8	236
	Mi.	18	37	2 .3	254
7.	En.	5	4	3 .2	247
	Te.	8	32	3 .9	241
	Mi.	17	14	2 .3	254
8.	En.	13	57	3 .1	247
	Mi.	15	52	2 .3	254
	Rh.	23	33 D	5 .8	224
9.	Rh.	1	5 R	2 .6	195
	Te.	5	50	3 .8	240
	Di.	7	0	4 .6	236
	Mi.	14	29	2 .3	254
	En.	22	50	3 .1	247
10.	Mi.	13	6	2 .2	254
11.	Te.	3	9	3 .7	240
	En.	7	44	3 .0	247
	Mi.	11	43	2 .2	253
12.	Di.	0	42	4 .4	236
	Mi.	10	21	2 .2	253
	En.	16	37	3 .0	247
13.	Te.	0	28	3 .6	240
	Mi.	8	58	2 .2	253
	Rh.	12	3 D	5 .3	222
	Rh.	13	28 R	2 .5	194
14.	En.	1	30	2 .9	247
	Mi.	7	35	2 .1	253
	Di.	18	24	4 .2	235
	Te.	21	47	3 .5	240
15.	Mi.	6	12	2 .1	253
	En.	10	23	2 .9	247
16.	Mi.	4	50	2 .1	253
	Te.	19	6	3 .4	240
	En.	19	16	2 .8	247
17.	Mi.	3	27	2 .1	253
	Di.	12	7	4 .0	235
18.	Rh.	0	34 D	4 .8	220

1908.		Gr. M. T.		s.	p.
Aug. 18.	Rh.	1h	52m R	2″.3	194°
	Mi.	2	4	2 .1	253
	En.	4	10	2 .7	247
	Te.	16	25	3 .3	240
19.	Mi.	0	41	2 .0	253
	En.	13	3	2 .7	247
	Mi.	23	19	2 .0	253
20.	Di.	5	49	3 .8	234
	Te.	13	44	3 .2	239
	Mi.	21	56	2 .0	253
	En.	21	56	2 .6	247
21.	Mi.	20	33	1 .9	253
22.	En.	6	49	2 .5	247
	Te.	11	3	3 .0	239
	Rh.	13	6 D	4 .3	218
	Rh.	14	15 R	2 .1	193
	Mi.	19	10	1 .9	253
	Di.	23	31	3 .6	234
23.	En.	15	43	2 .5	247
	Mi.	17	48	1 .8	252
24.	Te.	8	22	2 .9	239
	Mi.	16	25	1 .8	252
25.	En.	0	36	2 .4	247
	Mi.	15	2	1 .7	252
	Di.	17	14	3 .4	234
26.	Te.	5	41	2 .8	239
	En.	9	29	2 .4	246
	Mi.	13	40	1 .7	252
27.	Rh.	1	38 D	3 .6	215
	Rh.	2	38 R	1 .9	193
	Mi.	12	17	1 .7	252
	En.	18	22	2 .3	246
28.	Te.	3	0	2 .7	238
	Mi.	10	54	1 .7	252
	Di.	10	56	3 .2	233
29.	En.	3	16	2 .2	246
	Mi.	9	32	1 .6	252
30.	Te.	0	19	2 .5	238
	Mi.	8	9	1 .6	252
	En.	12	9	2 .1	246
31.	Di.	4	38	3 .0	233
	Mi.	6	46	1 .5	252
	Rh.	14	11 D	3 .0	211
	Rh.	14	59 R	1 .8	193
	En.	21	2	2 .0	246
	Te.	21	38	2 .4	238
Sept. 1.	Mi.	5	23	1 .5	252

1908.		Gr. M. T.		s.	p.
Sept. 2.	Mi.	4h	1m	1″.5	252°
	En.	5	56	1 .9	246
	Te.	18	57	2 .2	238
	Di.	22	21	2 .8	232
3.	Mi.	2	38	1 .4	252
	En.	14	49	1 .8	246
4.	Mi.	1	15	1 .4	251
	Te.	16	16	2 .1	237
	En.	23	42	1 .8	246
	Mi.	23	53	1 .4	251
5.	Rh.	2	46 D	2 .4	206
	Rh.	3	19 R	1 .6	193
	Di.	16	3	2 .5	231
	Mi.	22	30	1 .3	251
6.	En.	8	36	1 .7	246
	Te.	13	35	1 .9	237
	Mi.	21	7	1 .3	251
7.	En.	17	29	1 .6	246
	Mi.	19	44	1 .2	251
8.	Di.	9	46	2 .2	231
	Te.	10	54	1 .8	237
	Mi.	18	22	1 .2	251
9.	En.	2	22	1 .6	246
	Rh.	15	29	Eclipse?	
	Mi.	16	59	1 .1	251
10.	Te.	8	13	1 .6	236
	En.	11	16	1 .5	246
	Mi.	15	36	1 .1	251
11.	Di.	3	28	1 .9	230
	Mi.	14	14	1 .0	251
	En.	20	9	1 .4	246
12.	Te.	5	32	1 .5	236
	Mi.	12	51	1 .0	251
13.	En.	5	2	1 .3	246
	Mi.	11	28	0 .9	250
	Di.	21	11	1 .6	229
14.	Te.	2	51	1 .4	236
	Rh.	3	57	Eclipse?	
	Mi.	10	6	0 .9	250
	En.	13	56	1 .2	246
15.	Mi.	8	43	0 .8	250
	En.	22	49	1 .1	246
16.	Te.	0	10	1 .2	235
	Mi.	7	20	0 .8	250
	Di.	14	53	1 .3	228
17.	Mi.	5	58	0 .7	250
	En.	7	42	1 .0	245

1908.		Gr. M. T.	s.	p.	1908.		Gr. M. T.	s.	p.
Sept. 17.	Te.	$21^h\ 29^m$	1″.0	235°	Sept. 24.	En.	$4^h\ 9^m$	0″.5	245°
18.	Mi.	4 35	0 .7	250		Mi.	18 56	0 .3	249
	Rh.	16 24	Eclipse?			Di.	20 1	0 .4	226
	En.	16 36	0 .9	245	25.	Te.	10 45	0 .4	234
19.	Mi.	3 12	0 .6	250		En.	13 2	0 .4	245
	Di.	8 36	1 .0	228		Mi.	17 34	0 .3	249
	Te.	18 48	0 .9	235	26.	Mi.	16 11	0 .2	249
20.	En.	1 29	0 .8	245		En.	21 56	0 .3	245
	Mi.	1 50	0 .6	250	27.	Te.	8 4	0 .2	233
21.	Mi.	0 27	0 .5	250		Di.	13 44	0 .1	225
	En.	10 22	0 .7	245		Mi.	14 48	0 .2	249
	Te.	16 7	0 .7	234	28.	En.	6 49	0 .2	245
	Mi.	23 4	0 .5	249		Mi.	13 26	0 .1	249
22.	Di.	2 18	0 .7	227	29.	Te.	5 23	0 .1	233
	En.	19 16	0 .6	245		Mi.	12 3	0 .1	249
	Mi.	21 42	0 .4	249		En.	15 42	0 .1	245
23.	Te.	13 26	0 .6	234	30.	Mi.	10 41	0 .0	248
	Mi.	20 19	0 .4	249					

Reappearance after opposition.

s and *p* denote the geocentric place of the satellite at the time of its reappearance—i. e. the distance from the limb of the planet, and the position-angle, counted from the north point of the minor axis to the east.

1908.		Gr. M. T.	s.	p.	1908.		Gr. M. T.	s.	p.
Oct. 1.	En.	$2^h\ 57^m$	0″.0	115°	Oct. 10.	Mi.	$21^h\ 37^m$	0″.3	112°
	Mi.	11 24	0 .0	113	11.	Di.	8 18	0 .0	132
2.	Mi.	10 2	0 .0	113		Mi.	20 14	0 .3	112
	En.	11 50	0 .0	115	12.	En.	2 3	0 .4	112
3.	Mi.	8 39	0 .0	113		Te.	12 45	0 .2	125
	En.	20 44	0 .1	115		Mi.	18 51	0 .3	111
4.	Mi.	7 16	0 .0	113	13.	En.	10 57	0 .5	112
	Te.	23 30	0 .0	128		Mi.	17 29	0 .4	111
5.	En.	5 37	0 .1	114	14.	Di.	2 0	0 .1	130
	Mi.	5 53	0 .1	113		Te.	10 3	0 .3	124
6.	Mi.	4 31	0 .1	112		Mi.	16 6	0 .4	111
	En.	14 30	0 .2	114		En.	19 50	0 .5	112
	Te.	20 49	0 .0	127	15.	Mi.	14 43	0 .4	111
7.	Mi.	3 8	0 .1	112	16.	En.	4 43	0 .5	111
	En.	23 24	0 .3	113		Te.	7 22	0 .3	123
8.	Mi.	1 45	0 .2	112		Mi.	13 20	0 .4	111
	Di.	14 37	0 .0	133		Di.	19 41	0 .2	129
	Te.	18 7	0 .1	127	17.	Mi.	11 58	0 .5	110
9.	Mi.	0 22	0 .2	112		En.	13 37	0 .6	111
	En.	8 17	0 .3	113	18.	Te.	4 41	0 .4	123
	Mi.	23 0	0 .2	112		Mi.	10 35	0 .5	110
10.	Te.	15 26	0 .1	126		En.	22 30	0 .6	111
	En.	17 10	0 .4	113	19.	Mi.	9 12	0 .5	110

1908.		Gr. M. T.		s.	p.
Oct. 19.	Di.	13h	23m	0″.3	128°
20.	Te.	1	59	0 .4	122
	En.	7	23	0 .7	110
	Mi.	7	50	0 .5	110
21.	Mi.	6	27	0 .6	110
	En.	16	17	0 .7	110
	Te.	23	18	0 .5	122
22.	Mi.	5	4	0 .6	110
	Di.	7	4	0 .3	127
23.	En.	1	10	0 .7	110
	Mi.	3	42	0 .6	110
	Te.	20	37	0 .5	121
24.	Mi.	2	19	0 .7	109
	En.	10	3	0 .8	109
25.	Di.	0	46	0 .4	126
	Mi.	0	56	0 .7	109
	Te.	17	56	0 .6	121
	En.	18	57	0 .8	109
	Mi.	23	33	0 .7	109
26.	Mi.	22	11	0 .7	109
27.	En.	3	50	0 .9	109
	Te.	15	14	0 .6	120
	Di.	18	27	0 .5	124
	Mi.	20	48	0 .8	109
28.	En.	12	43	0 .9	109
	Mi.	19	25	0 .8	109
29.	Te.	12	33	0 .7	120
	Mi.	18	3	0 .8	109
	En.	21	37	1 .0	109
30.	Di.	12	9	0 .6	123
	Mi.	16	40	0 .8	109
31.	En.	6	30	1 .0	108
	Te.	9	52	0 .7	119
	Mi.	15	17	0 .8	108
Nov. 1.	Mi.	13	54	0 .9	108
	En.	15	24	1 .1	108
2.	Di.	5	51	0 .7	122
	Te.	7	10	0 .8	119
	Mi.	12	32	0 .9	108
3.	En.	0	17	1 .1	108
	Mi.	11	9	0 .9	108
4.	Te.	4	29	0 .8	119
	En.	9	10	1 .2	108
	Mi.	9	46	0 .9	108
	Di.	23	32	0 .8	122
5.	Mi.	8	24	1 .0	108
	En.	18	4	1 .2	108

1908.		Gr. M. T.		s.	p.
Nov. 6.	Te.	1h	48m	0″.9	118°
	Mi.	7	1	1 .0	108
7.	En.	2	57	1 .3	107
	Mi.	5	38	1 .0	108
	Di.	17	14	0 .9	121
	Te.	23	6	0 .9	118
8.	Mi.	4	16	1 .0	107
	En.	11	50	1 .3	107
9.	Mi.	2	53	1 .1	107
	Te.	20	25	1 .0	118
	En.	20	44	1 .4	107
10.	Mi.	1	30	1 .1	107
	Di.	10	55	0 .9	120
11.	Mi.	0	8	1 .1	107
	En.	5	37	1 .4	107
	Te.	17	44	1 .0	117
	Mi.	22	45	1 .2	107
12.	En.	14	30	1 .5	107
	Mi.	21	22	1 .2	107
13.	Di.	4	37	1 .0	119
	Te.	15	3	1 .1	117
	Mi.	20	0	1 .2	107
	En.	23	24	1 .5	107
14.	Mi.	18	37	1 .2	107
15.	En.	8	17	1 .5	106
	Te.	12	22	1 .1	117
	Mi.	17	14	1 .3	107
	Di.	22	18	1 .1	119
16.	Mi.	15	52	1 .3	106
	En.	17	11	1 .6	106
17.	Te.	9	40	1 .2	117
	Mi.	14	29	1 .3	106
18.	En.	2	4	1 .6	106
	Mi.	13	6	1 .3	106
	Di.	16	0	1 .1	118
19.	Te.	6	59	1 .2	116
	En.	10	57	1 .6	106
	Mi.	11	44	1 .4	106
20.	Mi.	10	21	1 .4	106
	En.	19	51	1 .7	106
21.	Te.	4	18	1 .3	116
	Mi.	8	58	1 .4	106
	Di.	9	41	1 .2	118
22.	En.	4	44	1 .7	106
	Mi.	7	35	1 .4	106
23.	Te.	1	37	1 .3	116
	Mi.	6	13	1 .4	106

1908.		Gr. M. T.	s.	p.
No. 23.	En.	$13^h\ 38^m$	1″.7	106°
24.	Di.	3 23	1 .2	118
	Mi.	4 50	1 .5	106
	En.	22 31	1 .8	106
	Te.	22 56	1 .4	116
25.	Mi.	3 27	1 .5	105
26.	Mi.	2 5	1 .5	105
	En.	7 24	1 .8	106
	Te.	20 14	1 .2	118
	Di.	21 4	1 .4	116
27.	Mi.	0 42	1 .5	105
	En.	16 18	1 .9	106
	Mi.	23 19	1 .5	105
28.	Te.	17 33	1 .4	115
	Mi.	21 57	1 .5	105
29.	En.	1 11	1 .9	105
	Di.	14 46	1 .2	118
	Mi.	20 34	1 .5	105
30.	En.	10 5	1 .9	105
	Te.	14 52	1 .4	115
	Mi.	19 11	1 .5	105
Dec. 1.	Mi.	17 49	1 .6	105
	En.	18 58	1 .9	105
2.	Di.	8 27	1 .2	118
	Te.	12 11	1 .4	115
	Mi.	16 26	1 .6	105
3.	En.	3 51	1 .9	105
	Mi.	15 3	1 .6	105
4.	Te.	9 30	1 .4	115
	En.	12 45	1 .9	105
	Mi.	13 41	1 .6	105
5.	Di.	2 8	1 .2	118
	Mi.	12 18	1 .6	105
	En.	21 38	1 .9	105
6.	Te.	6 48	1 .4	115
	Mi.	10 55	1 .6	105
7.	En.	6 32	2 .0	105
	Mi.	9 33	1 .6	105
	Di.	19 50	1 .2	118
8.	Te.	4 7	1 .4	115
	Mi.	8 10	1 .6	104
	En.	15 25	2 .0	105
9.	Mi.	6 47	1 .6	104
10.	En.	0 18	2 .0	105
	Te.	1 26	1 .5	115
	Mi.	5 24	1 .6	104
	Di.	13 31	1 .2	118
Dec. 11.	Mi.	$4^h\ 2^m$	1″.6	104°
	En.	9 12	2 .0	105
	Te.	22 45	1 .5	115
12.	Mi.	2 39	1 .6	104
	En.	18 5	2 .0	105
13.	Mi.	1 16	1 .6	104
	Di.	7 12	1 .2	118
	Te.	20 3	1 .5	115
	Mi.	23 54	1 .6	104
14.	En.	2 59	2 .0	105
	Mi.	22 31	1 .6	104
15.	En.	11 52	2 .0	105
	Te.	17 22	1 .5	116
	Mi.	21 8	1 .6	104
16.	Di.	0 54	1 .2	119
	Mi.	19 46	1 .6	104
	En.	20 46	2 .0	106
17.	Te.	14 41	1 .5	116
	Mi.	18 23	1 .6	104
18.	En.	5 39	2 .0	106
	Mi.	17 0	1 .6	104
	Di.	18 35	1 .1	119
19.	Te.	12 0	1 .4	116
	En.	14 32	2 .0	106
	Mi.	15 38	1 .6	104
20.	Mi.	14 15	1 .6	104
	En.	23 26	2 .0	106
21.	Te.	9 18	1 .4	116
	Di.	12 16	1 .1	120
	Mi.	12 52	1 .6	104
22.	En.	8 19	2 .0	106
	Mi.	11 30	1 .6	104
23.	Te.	6 37	1 .4	116
	Mi.	10 7	1 .6	104
	En.	17 13	2 .0	106
24.	Di.	5 58	1 .0	120
	Mi.	8 44	1 .6	104
25.	En.	2 6	2 .0	106
	Te.	3 56	1 .4	117
	Mi.	7 22	1 .6	104
26.	Mi.	5 59	1 .7	104
	En.	11 0	2 .0	106
	Di.	23 39	1 .0	121
27.	Te.	1 15	1 .4	117
	Mi.	4 36	1 .7	104
	En.	19 53	2 .0	106
28.	Mi.	3 13	1 .7	104

1908.		Gr. M. T.	*s.*	*p.*
Dec. 28.	Te.	$22^h\ 34^m$	1″.4	117°
29.	Mi.	1 51	1 .7	104
	En.	4 47	2 .0	106
	Di.	17 20	0 .9	121
30.	Mi.	0 28	1 .7	104
	En.	13 40	2 .0	106
	Te.	19 52	1 .4	117
	Mi.	23 5	1 .7	104
31.	Mi.	21 43	1 .7	104
	En.	22 34	1 .9	106
1909.				
Jan. 1.	Di.	11 1	0 .8	122
	Te.	17 11	1 .3	118
	Mi.	20 20	1 .7	104
2.	En.	7 27	1 .9	106
	Mi.	18 57	1 .7	104
3.	Te.	14 30	1 .3	118
	En.	16 20	1 .9	107
	Mi.	17 34	1 .7	104
4.	Di.	4 42	0 .7	123
	Mi.	16 12	1 .7	104
5.	En.	1 14	1 .9	107
	Te.	11 48	1 .3	119
	Mi.	14 49	1 .7	104
6.	En.	10 7	1 .8	107
	Mi.	13 26	1 .7	104
	Di.	22 22	0 .6	124
7.	Te.	9 7	1 .3	119
	Mi.	12 4	1 .7	104
	En.	19 1	1 .8	107
8.	Mi.	10 41	1 .7	104
9.	En.	3 54	1 .8	107
	Te.	6 26	1 .2	119
	Mi.	9 18	1 .6	104
	Di.	16 3	0 .5	125
10.	Mi.	7 55	1 .6	104
	En.	12 47	1 .8	107
11.	Te.	3 45	1 .2	120
	Mi.	6 33	1 .6	104
	En.	21 41	1 .8	108
12.	Mi.	5 10	1 .6	104
	Di.	9 44	0 .4	126

1909.		Gr. M. T.	*s.*	*p.*
Jan. 13.	Te.	$1^h\ 4^m$	1″.2	120°
	Mi.	3 47	1 .6	104
	En.	6 34	1 .8	108
14.	Mi.	2 24	1 .6	104
	En.	15 28	1 .8	108
	Te.	22 22	1 .1	120
15.	Mi.	1 2	1 .6	104
	Di.	3 24	0 .3	127
	Mi.	23 39	1 .6	104
16.	En.	0 21	1 .8	108
	Te.	19 41	1 .1	121
	Mi.	22 16	1 .6	104
17.	En.	9 14	1 .7	108
	Mi.	20 53	1 .5	104
	Di.	21 4	0 .2	129
18.	Te.	17 0	1 .0	121
	En.	18 8	1 .7	108
	Mi.	19 31	1 .5	104
19.	Mi.	18 8	1 .5	104
20.	En.	3 1	1 .7	109
	Te.	14 18	1 .0	122
	Di.	14 44	0 .1	131
	Mi.	16 45	1 .5	104
21.	En.	11 55	1 .7	109
	Mi.	15 22	1 .5	104
22.	Te.	11 37	0 .9	123
	Mi.	14 0	1 .5	104
	En.	20 48	1 .6	109
23.	Di.	8 24	0 .0	133
	Mi.	12 37	1 .5	104
24.	En.	5 42	1 .6	110
	Te.	8 56	0 .9	123
	Mi.	11 14	1 .5	104
25.	Mi.	9 51	1 .5	104
	En.	14 35	1 .6	110
26.	Te.	6 15	0 .8	124
	Mi.	8 28	1 .5	104
	En.	23 28	1 .5	110
27.	Mi.	7 6	1 .5	104
28.	Te.	3 33	0 .8	124
	Mi.	5 43	1 .5	104
	En.	8 22	1 .5	110

SHADOWS OF THE SATELLITES *TETHYS, DIONE, RHEA.*

Crossing the minor axis of the disk at the distance y from the center.

1908.		Gr. M. T.	y		1908.		Gr. M. T.	y	
July 1.	Te.	$14^h.3$	4″.5	North	Au. 10.	Te.	$5^h.8$	5″.4	North
	Rh.	14 .5	6 .8			Di.	17 .1	6 .1	
3.	Di.	9 .4	5 .3		11.	Rh.	6 .6	8 .0	
	Te.	11 .6	4 .5		12.	Te.	3 .1	5 .5	
5.	Te.	8 .9	4 .6		13.	Di.	10 .8	6 .2	
6.	Rh.	3 .0	6 .9		14.	Te.	0 .4	5 .5	
	Di.	3 .1	5 .3		15.	Rh.	19 .0	8 .1	
7.	Te.	6 .2	4 .7			Te.	21 .7	5 .5	
8.	Di.	20 .8	5 .4		16.	Di.	4 .5	6 .2	
9.	Te.	3 .6	4 .7		17.	Te.	19 .0	5 .5	
10.	Rh.	15 .4	7 .1		18.	Di.	22 .2	6 .3	
11.	Te.	0 .9	4 .8		19.	Te.	16 .3	5 .6	
	Di.	14 .5	5 .5		20.	Rh.	7 .4	8 .2	
12.	Te.	22 .2	4 .8		21.	Te.	13 .7	5 .6	
14.	Di.	8 .2	5 .5			Di.	15 .9	6 .3	
	Te.	19 .5	4 .9		23.	Te.	11 .0	5 .6	
15.	Rh.	3 .9	7 .2		24.	Di.	9 .6	6 .4	
16.	Te.	16 .8	4 .9			Rh.	19 .9	8 .3	
17.	Di.	1 .9	5 .6		25.	Te.	8 .3	5 .6	
18.	Te.	14 .1	5 .0		27.	Di.	3 .3	6 .4	
19.	Rh.	16 .3	7 .3			Te.	5 .6	5 .7	
	Di.	19 .6	5 .6		29.	Te.	2 .9	5 .7	
20.	Te.	11 .4	5 .0			Rh.	8 .3	8 .4	
22.	Te.	8 .7	5 .1			Di.	21 .0	6 .5	
	Di.	13 .3	5 .7		31.	Te.	0 .2	5 .7	
24.	Rh.	4 .8	7 .4		Sept. 1.	Di.	14 .6	6 .5	
	Te.	6 .0	5 .1			Te.	21 .5	5 .7	
25.	Di.	7 .0	5 .8		2.	Rh.	20 .8	8 .6	?
26.	Te.	3 .3	5 .2		3.	Te.	18 .8	5 .8	
28.	Te.	0 .6	5 .2		4.	Di.	8 .4	6 .6	
	Di.	0 .6	5 .8		5.	Te.	16 .1	5 .8	
	Rh.	17 .2	7 .6		7.	Di.	2 .0	6 .6	
29.	Te.	22 .0	5 .3			Rh.	9 .2	8 .7	?
30.	Di.	18 .3	5 .9			Te.	13 .4	5 .8	
31.	Te.	19 .3	5 .3		9.	Te.	10 .8	5 .8	
Aug. 2.	Rh.	5 .7	7 .7			Di.	19 .7	6 .6	
	Di.	12 .0	6 .0		11.	Te.	8 .1	5 .9	
	Te.	16 .6	5 .3			Rh.	21 .7	8 .8	?
4.	Te.	13 .9	5 .4		12.	Di.	13 .4	6 .7	
5.	Di.	5 .7	6 .0		13.	Te.	5 .4	5 .9	
6.	Te.	11 .2	5 .4		15.	Te.	2 .7	5 .9	
	Rh.	18 .1	7 .8			Di.	7 .1	6 .7	
7.	Di.	23 .4	6 .1		17.	Te.	0 .0	5 .9	
8.	Te.	8 .5	5 .4		18.	Di.	0 .8	6 .7	

1908.		Gr. M. T.	y	
Sep. 18.	Te.	21h.3	5″.9	North
20.	Di.	18 .5	6 .8	
	Te.	18 .6	5 .9	
22.	Te.	15 .9	5 .9	
23.	Di.	12 .2	6 .8	
24.	Te.	13 .2	5 .9	
26.	Di.	5 .9	6 .8	
	Te.	10 .5	6 .0	
28.	Te.	7 .8	6 .0	
	Di.	23 .6	6 .9	
30.	Te.	5 .2	6 .0	
Oct. 1.	Di.	17 .3	6 .9	
2.	Te.	2 .5	6 .0	
3.	Te.	23 .8	6 .0	
4.	Di.	11 .0	6 .9	
5.	Te.	21 .1	6 .0	
7.	Di.	4 .7	6 .9	
	Te.	18 .4	6 .0	
9.	Te.	15 .7	6 .0	
	Di.	22 .4	7 .0	
11.	Te.	13 .0	6 .0	
12.	Di.	16 .1	7 .0	
13.	Te.	10 .3	6 .1	
15.	Te.	7 .6	6 .1	
	Di.	9 .8	7 .0	
17.	Te.	5 .0	6 .1	
18.	Di.	3 .5	7 .0	
19.	Te.	2 .3	6 .1	
20.	Di.	21 .2	7 .1	
	Te.	23 .6	6 .1	
22.	Te.	20 .9	6 .1	
23.	Di.	14 .9	7 .1	
24.	Te.	18 .2	6 .1	
26.	Di.	8 .6	7 .1	
	Te.	15 .5	6 .2	
28.	Te.	12 .8	6 .2	
29.	Di.	2 .3	7 .1	
30.	Te.	10 .2	6 .2	
31.	Di.	20 .0	7 .1	
Nov. 1.	Te.	7 .5	6 .2	
3.	Te.	4 .8	6 .2	
	Di.	13 .7	7 .1	
5.	Te.	2 .1	6 .2	
6.	Di.	7 .4	7 .2	
	Te.	23 .4	6 .2	
8.	Te.	20 .7	6 .2	
9.	Di.	1 .1	7 .2	

1908.		Gr. M. T.	y	
No. 10.	Te.	18h.0	6″.2	North
11.	Di.	18 .8	7 .2	
12.	Te.	15 .4	6 .3	
14.	Di.	12 .5	7 .2	
	Te.	12 .7	6 .3	
16.	Te.	10 .0	6 .3	
17.	Di.	6 .2	7 .2	
18.	Te.	7 .3	6 .3	
19.	Di.	23 .9	7 .3	
20.	Te.	4 .6	6 .3	
22.	Te.	1 .9	6 .3	
	Di.	17 .6	7 .3	
23.	Te.	23 .3	6 .3	
25.	Di.	11 .3	7 .3	
	Te.	20 .6	6 .4	
27.	Te.	17 .9	6 .4	
28.	Di.	5 .0	7 .3	
29.	Te.	15 .2	6 .4	
30.	Di.	22 .7	7 .3	
Dec. 1.	Te.	12 .5	6 .4	
3.	Te.	9 .8	6 .4	
	Di.	16 .4	7 .3	
5.	Te.	7 .2	6 .4	
6.	Di.	10 .1	7 .3	
7.	Te.	4 .5	6 .4	
9.	Te.	1 .8	6 .4	
	Di.	3 .8	7 .3	
10.	Te.	23 .1	6 .4	
11.	Di.	21 .5	7 .3	
12.	Te.	20 .4	6 .4	
14.	Di.	15 .2	7 .4	
	Te.	17 .8	6 .4	
16.	Te.	15 .1	6 .4	
17.	Di.	8 .9	7 .4	
18.	Te.	12 .4	6 .4	
20.	Di.	2 .6	7 .4	
	Te.	9 .7	6 .4	
22.	Te.	7 .0	6 .4	
	Di.	20 .4	7 .4	
24.	Te.	4 .4	6 .4	
25.	Di.	14 .1	7 .4	
26.	Te.	1 .7	6 .4	
27.	Te.	23 .0	6 .4	
28.	Di.	7 .8	7 .4	
29.	Te.	20 .3	6 .4	
31.	Di.	1 .5	7 .4	
	Te.	17 .6	6 .4	

1909.		Gr. M. T.	y
Jan. 2.	Te.	$15^h.0$	6″.4 North
	Di.	19 .2	7 .4
4.	Te.	12 .3	6 .4
5.	Di.	12 .9	7 .4
6.	Te.	9 .6	6 .4
8.	Di.	6 .6	7 .4
	Te.	6 .9	6 .4
10.	Te.	4 .2	6 .4
11.	Di.	0 .3	7 .4
12.	Te.	1 .6	6 .4
13.	Di.	18 .0	7 .5
	Te.	22 .9	6 .4
15.	Te.	20 .2	6 .4

1909.		Gr. M. T.	y
Jan 16.	Di.	$11^h.8$	7″.5 North
17.	Te.	17 .5	6 .4
19.	Di.	5 .5	7 .5
	Te.	14 .8	6 .4
21.	Te.	12 .2	6 .5
	Di.	23 .2	7 .5
23.	Te.	9 .5	6 .5
24.	Di.	16 .9	7 .5
25.	Te.	6 .8	6 .5
27.	Te.	4 .1	6 .5
	Di.	10 .6	7 .5
29.	Te.	1 .4	6 .5

THE CORONAL SPECTRUM AS OBSERVED AT THE FLINT ISLAND ECLIPSE.

By W. W. Campbell and Sebastian Albrecht.

Two single-prism spectrographs were designed by Mr. Campbell for efficiency in recording the continuous spectrum of the corona. These and a three-prism spectrograph, referred to below, were mounted on one clock-driven polar axis. All were adjusted by Mr. Albrecht, assisted by Mr. Merfield, and the programme of observations at the time of the eclipse was carried out perfectly by Mr. Merfield. The slits of the three instruments extended east and west centrally across the Sun's image.

One of the single-prism instruments, using a Seed plate No. 27, was exposed from $0^m\ 5^s$ to $3^m\ 51^s$. The spectrum of the extreme inner corona is recorded from λ 3550 to λ 5390. It is very strong for the first 2′ from the limb; the intensity falls off gradually out to a distance of 15′–20′ from each limb; and the intensity is then nearly uniform out to the ends of the slit, 49′ on the east side of the Sun and 40′ on the west. A continuous spectrum covers the region corresponding to the Moon, the intensities near the ends of the slit being slightly less than over the Moon.